UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/855,073	05/14/2001	David Tucker	37357.0100	8589

758 7590 11/02/2005			EXAMINER

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ART UNIT	PAPER NUMBER
2134	

DATE MAILED: 11/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	09/855,073	TUCKER ET AL.
	Examiner	Art Unit
	Matthew Heneghan	2134

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

    A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 August 2005*.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-57* is/are pending in the application.

    4a) Of the above claim(s) *11, 13-20, 24-42, 46, 47 and 54-57* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10, 12, 21-23 and 48-53* is/are rejected.

7)☒ Claim(s) *43-45* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 August 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date *8/15/05*.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

1.   In response to the previous office action, claims 1-4, 10, 12, 21, 22, 48, 49, and

53 have been amended. Claims 1-10, 12, 21-23, 43-45, and 48-53 have been

examined.

Information Disclosure Statement

2.   The following Information Disclosure Statement in the instant application has

been considered:

     IDS filed 15 August 2005.

Drawings

3.   The drawings were received on 15 August 2005. These drawings are not

acceptable.

4.   The drawings are objected to as failing to comply with 37 CFR 1.84(m) because

the shading of the graphic in figure 7 makes it illegible.

5.   Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in

reply to the Office action to avoid abandonment of the application. Any amended

replacement drawing sheet should include all of the figures appearing on the immediate

prior version of the sheet, even if only one figure is being amended. Each drawing sheet

submitted after the filing date of an application must be labeled in the top margin as

either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the

changes are not accepted by the examiner, the applicant will be notified and informed of

any required corrective action in the next Office action. The objection to the drawings

will not be held in abeyance.

Specification

6.   The use of the trademarks Java, Visual Basic, InstallShield, Unix, Linux,

Appletalk, and BeOS have been noted in this application. It should be capitalized

wherever it appears and be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the

proprietary nature of the marks should be respected and every effort made to prevent

their use in any manner which might adversely affect their validity as trademarks.

Claim Objections

7.   In view of Applicant's amendments, all previous claim objections are withdrawn.

Claim Rejections - 35 USC § 101

8.   In view of Applicant's amendments, all previous rejections are 35 U.S.C. 101 are

withdrawn.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9.   Claim 23 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply

with the enablement requirement. The claim(s) contains subject matter which was not

described in the specification in such a way as to enable one skilled in the art to which it

pertains, or with which it is most nearly connected, to make and/or use the invention.

Applicant's specification merely refers to several methods for several recovery methods

that are not well-known in the art (symmetric correlation, asymmetric correlation, etc.)

without describing the methods. It is being presumed that any deobfuscation method

teaches to claim 23.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10.   In view of Applicant's amendments, the previous rejections under 35 U.S.C. 112,

second paragraph of claims 2-4 have been withdrawn.

11.   Claim 22 is rejected under 35 U.S.C. 112, second paragraph, as being

incomplete for omitting essential structural cooperative relationships of elements, such

omission amounting to a gap between the necessary structural connections. See

MPEP § 2172.01.

Regarding claim 22, the omitted structural cooperative relationships are: No

limitation shows how the original instruction code length calculation recited in the first

limitation is related to the remainder of the invention. Since all modern computer

systems maintain the sizes of files, this limitation is being deemed as inherent.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12.   Claim 1-4, 6-10, 12, and 21-23 are rejected under 35 U.S.C. 103(a) as being

unpatentable over WIPO Patent Publication No. 99/01815 to Collberg et al. in view of

U.S. Patent No. 6,829,710 to Venkatesan et al.

As per claims 1 and 10, the system disclosed by Collberg takes compiled code and obfuscates (i.e. creates isomorphic code) it in a random manner when possible. In order to determine when obfuscation is possible, the code must be scanned (see abstract; p. 53, line 21 to p. 55, line 16; and p. 68 line 14 to p. 69, line 9).

Collberg does not disclose the random selection from a set of isomorphic codes.

Venkatesan discloses the random selection of functions from a library in the process of protecting (watermarking by obfuscation) code (see column 7, lines 25-51), and suggests that this is done to frustrate third-part detection of the watermark (see abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Collberg by randomly selecting functions from a library in the process of watermarking code, as disclosed by Venkatesan, as this is done to frustrate third-part detection of the watermark.

As per claims 2 and 3, Collberg further discloses the combining of multiple types of transformations (at least three types are disclosed), thus creating later generation isomorphs (see p. 53, lines 10-19 and p.86, line 27 to p. 89, line 22).

As per claim 4, Collberg discloses the generation of different obfuscated versions of a program for different customers (see p. 98, lines 24-30).

As per claim 6, Collberg discloses Java® applications, which are generated at a server and executed on a client (see entire document).

As per claim 7, Collberg discloses the insertion of inert (benign) code (see p. 42, lines 4-27).

As per claims 8 and 9, the system is implemented on a stand-alone system

called "Kava," which may optionally use libraries (see p. 4, lines 13-15 and p. 25, line 25

to p. 26, line 15).

Regarding claim 12, 21, and 22, compiled code comprises original CPU

instructions.

Regarding claim 23, Collberg describes several deobfuscation algorithms (see p.

72, line 1 to p. 83, line 2).

13.   Claims 1 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over

U.S. Patent No. 5,696,822 to Nachenberg in view of U.S. Patent No. 6,829,710 to

Venkatesan et al.

Nachenberg discloses that a polymorphic virus (i.e. self-replicating code)

provides each new file with a mutated (obfuscated) version of the virus, as this

frustrates most standard virus-detection schemes (see column 1, lines 11-17).

Nachenberg does not disclose the random selection from a set of isomorphic

codes.

Venkatesan discloses the random selection of functions from a library in the

process of protecting (watermarking by obfuscation) code (see column 7, lines 25-51),

and suggests that this is done to frustrate third-part detection of the watermark (see

abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time

the invention was made to modify the invention of Nachenberg by randomly selecting

functions from a library in the process of watermarking code, as disclosed by

Venkatesan, as this is done to frustrate third-part detection of the watermark.

14.   Claims 48, 49, and 51-53 are rejected under 35 U.S.C. 103(a) as being

unpatentable over U.S. Patent No. 6,006,328 to Drake further in view of U.S. Patent No.

6,829,710 to Venkatesan et al.

Regarding claims 48 and 49, Drake discloses the insertion of obfuscating code,

which is isomorphic, in appropriate places. Scanning the code is necessary to

determine such places (see column 5, line 37 to column 6, line 3). Drake also discloses

the encryption of code after obfuscation, and notes that the encryption scheme used

can be subjected to substantial variation (see column 16, lines 3-9).

Drake does not disclose the use of random algorithms.

Venkatesan discloses the random selection of functions from a library in the

process of protecting (watermarking by obfuscation) code (see column 7, lines 25-51),

and suggests that this is done to frustrate third-part detection of the watermark (see

abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time

the invention was made to modify the invention of Drake by randomly selecting

functions from a library in the process of watermarking code, as disclosed by

Venkatesan, as this is done to frustrate third-part detection of the watermark.

Regarding claim 51, Drake discloses a symmetric algorithm, DES, as an

exemplary encryption algorithm; the combination of Drake and Venkatesan therefore

would offer a symmetric algorithm.

Regarding claim 52, the invention of Drake is intended for try-before-you-buy

software (see column 3, lines 1-6).

Regarding claim 53, Drake discloses the use of a signature key (a checksum)

which prevents the successful decryption if the code has been tampered with (see

column 16, lines 44-48).

15.   Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S.

Patent No. 6,006,328 to Drake further in view of U.S. Patent No. 6,829,710 to

Venkatesan et al.as applied to claim 48 further in view of U.S. Patent No. 5,966,450 to

Hosford et al.

Drake and Venkatesan do not disclose the usage of a previous result for key

generation.

Hosford discloses the results from previous iterations to generate keys (see

column 5, lines 43-55), and further suggests that this increase the difficulty of

unauthorized decryption (see column 4, lines 5-11).

Therefore it would be obvious to one of ordinary skill in the art at the time the

invention was made to modify the invention of Drake and Venkatesan by using the

results from previous iterations to generate keys, as disclosed by Hosford, as this

increase the difficulty of unauthorized decryption.

Allowable Subject Matter

16.   Claims 43-45 are objected to as being dependent upon a rejected base claim,

but would be allowable if rewritten in independent form including all of the limitations of

the base claim and any intervening claims.

17.   The following is a statement of reasons for the indication of allowable subject

matter: No art could be found that suggested a detection of tampering of obfuscated

code by comparing two generated CRC's, one generated during code execution. The

closest art, Drake, which uses checksums, and U.S. Patent No. 6,587,947 to O'Donnell

et al., which uses CRCs to authenticate obfuscated code, do not use the values during

execution. Venkatesan suggests the use of error correction procedures (see column 8,

lines 13-16), but not to system files.

Response to Arguments

18.   Regarding the rejection of claim 23 under 35 U.S.C. 112, first paragraph,

Applicant's arguments filed 15 August 2005 have been fully considered but they are not

persuasive. In order for a claim containing a Markush group to satisfy the enablement

requirement under 35 U.S.C. 112, first paragraph, *every* individual member of that

group must be enabled by the disclosure. While it is agreed that look-up tables and

database queries are well-known in the art and that one of ordinary skill in the art would recognize the algorithm in the last paragraph of page 12 (see Remarks, filed 15 August 2005, p. 26) as a functional correlation in view of Applicant's arguments, as well as a one-way function, an ordinary would not recognize a symmetric correlation, asymmetric correlation, or parametric correlation from Applicant's disclosure. Each of these three terms are not well-known in the art and are only nominally recited in Applicant's disclosure. There is no guidance as to how an ordinary would recognize that they are being practiced.

19.   Regarding the rejection of claim 22 under 35 U.S.C. 112, second paragraph, Applicant's arguments filed 15 August 2005 have been fully considered but they are not persuasive. None of the other limitations teach to the relevance of the length calculation made in the first limitation. Applicant could overcome this rejection by amending the second or third limitations such that at least one of them uses the calculated length for some purpose.

20.   Applicant's arguments, see Remarks, filed 15 August 2005, with respect to the rejections of the claims under 35 U.S.C. 102 and 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of the art cited above.

Conclusion

21.   Applicant's amendment necessitated the new ground(s) of rejection presented in

this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37

CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the date of this final action.

22.   The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure.

U.S. Patent No. 5,748,741 to Johnson et al. discloses various techniques for

code obfuscation.

U.S. Patent No. 5,892,899 to Aucsmith et al. discloses code obfuscation using

random patterns.

U.S. Patent No. 6,594,761 to Chow et al. discloses obfuscation by transforming

code flows.

U.S. Patent Application Publication No. 2002/0027986 to Brenke discloses code

obfuscation using symbolic logic.

23.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Matthew E. Heneghan, whose telephone number is

(571) 272-3834. The examiner can normally be reached on Monday-Friday from 8:30

AM - 4:30 PM Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Gregory Morse, can be reached at (571) 272-3838.

Any response to this action should be mailed to:
Commissioner of Patents and Trademarks
P.O. Box 1450
Alexandria, VA 22313-1450
Or faxed to:
(571) 273-3800

Any inquiry of a general nature or relating to the status of this application or

proceeding should be directed to the receptionist whose telephone number is (571) 272-

2100.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

GREGORY MORSE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100

MEH

October 22, 2005